XV.—*Descriptions of Sponges from the Neighbourhood of Port Phillip Heads, South Australia, continued.* By H. J. Carter, F.R.S. &c.

[Continued from p. 55.]

Order VIII. CALCAREA (*continued*).

Observation.

We now come to Calcareous Sponges wherein the spicules and sarcode apparently do not present any definite arrangement like that of the foregoing species, but, on the contrary, one in which both are apparently mixed together confusedly, so as to form a cancellated mass, which is traversed by a branched system of excretory canals identical with that of the non-calcareous sponges, the former representing the parenchyma and the latter the channels of the excretory system.

To this structure the name of "*Leuconia*" was given by Dr. Bowerbank in 1864 (Mon. Brit. Spong. vol. ii. p. 2), ex. gr. *L. fistulosa* (*Leucandra fistulosa*, H.), and the same name will be adopted here.

Häckel put these sponges into his second family under the name of "*Leucones*," which he has divided into genera; but at present I can only give my attention to the species *in Mr. Wilson's collection*, under the general title of "*Leuconia*," and leave others to divide them into genera hereafter when a complete history of the calcareous sponges shall be produced.

Since describing the last of the Ascones ('Annals,' 1886, vol. xvii. p. 512), viz. *Clathrina ventricosa*, wherein the amount of parenchyma far exceeds that observed in any of the Sycones, as before stated (*suprà*, p. 35), this structure has not presented itself to anything like the extent of that characterizing the sponges about to be noticed, although the excretory canal-system may be easily homologized throughout. Hence the following diagnosis under the "heading" before mentioned, viz.:—

Leuconia.

Calcareous sponges in which the parenchyma is almost equal in amount to the excretory canal-system, which traverses it in all directions by repeated subdivision, until one is as infinitely divided as the other. Canals poriferous throughout.

28. *Leuconia fistulosa*, var. *australiensis*.

Individualized. Specimen long, straight, sacciform, and so flatly compressed that the sides are in close approximation; suddenly contracted at the free end to 6-16ths inch, while the rest of the body generally is 10-12ths inch in diameter; provided with a peristome (whose spicules are broken off so shortly that the mouth looks as if it were *naked*); convex at the large end, where it was attached by the most prominent part to the object on which it grew. Colour sponge-brown. Surface consisting of cribriform sarcode charged with sagittal triradiates and densely traversed by more or less long flimsy acerates, arranged in thin, broken, indistinct lines, apparently without any uniformity. Pores, which are the holes of the cribriform sarcode, comparatively small in size. Vent single, terminal, occupying the free end of the specimen, which is truncate, compressed to a narrow slit; surrounded by a peristome; leading into a large cloacal cavity corresponding in shape with that of the body, which is slightly contracted in the centre; scattered over with holes of different sizes and different distances apart, some very large and deeply sunk into the internal structure, others very small and shallow, all showing *inwardly* a variable number of openings, which belong to the excretory canals of the wall-structure; surface of the cloaca, its holes and deep depressions, all echinated with the short and curved fourth ray of quadriradiates. Structure of the wall, which, compared with the width of the cloaca, is very thin (not being more than 3-24ths inch in diameter), composed of cancellated sarcode traversed by the canals of the excretory canal-system, which, repeatedly branching, subdivide the whole almost infinitely: supported on small triradiates, which appear to have no definite arrangement. Spicules of three kinds, viz. acerate, triradiate, and quadriradiate:—1, acerates, of different lengths and different sizes, the longest and finest chiefly confined to the peristome (but for the most part broken off, so that their original length cannot be ascertained); some, viz. the stoutest, which remain entire, fusiform, bent at the extremity, and much shorter than the rest, averaging 150 by 12-6000ths inch. 2, triradiates, regular and irregular, of different sizes and forms, chiefly sagittal. 3, quadriradiates, of much the same size, which is rather small. No. 1 in its finest and longest forms chiefly characterizes the peristome, but is equally spread all over the body together with the shorter and stouter ones, all mixed up in a matted more or less shaggy mass, so that when dry the whole surface glistens from the silky flimsy nature of

the *fine* spicules; no. 2 equally present in the wall-structure and its outer and inner layers, viz. that of the surface and that of the cloaca respectively; no. 3 is chiefly confined to the cloaca, where its fourth ray, which is short and curved, thickly echinates not only the general surface of this cavity, but the circular margins of the holes and the surface of the canals within them respectively. Size of specimen $3\frac{1}{2}$ inches long by 10-12ths inch in its widest diameter.

Obs. One cannot help seeing in this specimen the Australian representative of the British *Leuconia fistulosa*, Bk.,= *Grantia fistulosa*, Johnston, of which the type specimen is in the British Museum; nor can we help seeing in the excretory canal-system a close approach to that of the non-calcareous sponges.

29. *Leuconia hispida.*

Individualized. Erect, conoglobular, compressed, contracted towards the base, peristomed. Colour whitish yellow on the outside, sponge-brown within. Surface thickly echinated with comparatively thin fusiform acerates, held together rather confusedly in indistinct groups by cribriform sarcode, which in the intervals often presents defined areas. Pores, viz. the holes of the cribriform sarcode, of different sizes, varying under 1-451st in. in diameter. Vent single, circular, terminal, on the summit, provided with a peristome about 1-16th in. in diameter, leading into the cloacal cavity, which becomes three times as wide, corresponding in form with that of the specimen; holes in the cloaca very variable in size and distance apart, the latter depending on the width of the cloaca-skeletal structure between them; presenting *within* their border from one to four or more circular openings, which belong to the excretory canals of the internal structure; thus every hole in the cloacal surface is tantamount to that of a subcloacal vent; surface of the cloaca and margins of the holes respectively thickly echinated with the long curved fourth arms of quadriradiates. Structure of the wall, which is thick, cancellated, traversed by the canals of the excretory system, supported skeletally on smallish triradiates. Spicules of three kinds, viz. acerate, triradiate, and quadriradiate:— 1, acerates, of two forms, viz. one long, thin, straight, cylindrical, silky, and the other slightly curved, stouter, and fusiform, the latter averaging 200 by 4-6000ths in.; 2, triradiates, all apparently about the same size, which is comparatively small, regular and irregular, with the arms in different degrees of sagittal expansion; 3, quadriradiates, numerous. No. 1,

in its thin form, is confined to the peristome, and in its stouter one to the surface, where it is indistinctly grouped into tufts between the cribriform areas; no. 2 to the structure of the wall generally; and no. 3, the quadriradiates, to the surface of the cloaca, where its fourth arm, which is long and curved, thickly echinates the surface. Size of specimen 7-12ths inch high, not including the peristome, by 5-12ths inch in its greatest transverse diameter, being rather compressed.

Obs. This species is closely allied to *Leuconia fistulosa*, var. *australiensis*, in most respects.

30. *Leuconia echinata.*

Individualized and social. Pyriform, wide above, narrow below, where it is contracted and turned on one side towards the point of attachment; peristomed; thickly echinated with large, much curved acerates. Colour whitish yellow outside, sponge-brown within. Surface composed of cribriform sarcode in the midst of small radiates; echinated with the acerates mentioned. Pores, the holes in the cribriform sarcode, most of which are comparatively small, while the rest, scattered here and there, vary under 1-166th inch in diameter. Vent single, circular, terminal, surrounded by a peristome, leading into a sacciform cloacal cavity corresponding in shape to that of the specimen, a little wider in its widest part than the thickness of the wall; holes in the cloaca subcircular, large and wide apart, each sphinctered by cribriform sarcode, whose interstices are circular and in more or less plurality, varying in diameter under half that of the subjacent hole; surface of the cloaca moderately covered with thick curved spines, viz. the fourth arms of quadriradiates. Structure of the wall cancellous, supported on the rays of large triradiates, and traversed by the canals of the excretory system. Spicules of three kinds, viz. acerate, triradiate, and quadriradiate:—1, acerates of two forms, viz. one long, straight, thin, cylindrical, silky, and the other thick, fusiform, much curved, and very thick, the latter averaging 450 by 18-6000ths in.; 2, triradiates of different sizes and different degrees of irregularity, the smallest and most regular on the surface, the next in size on the surface of the cloaca, and by far the largest of all, whose shaft may be 102 by 18-6000ths and arms respectively 150 by 18-6000ths, confined to the wall-structure; 3, quadriradiates, in which the fourth arm is thick and curved. No. 1 is confined to the peristome in its fine straight form, and in its curved and stout one thickly echinates the surface, where its outer part, which is the largest and most curved, is directed

towards the mouth and its inner one directed backwards, to become sunk into the structure of the wall; no. 2, the triradiates, are disposed as before mentioned; and no. 3 is chiefly confined to the surface of the cloaca, where its fourth arm, which is thick, moderately long, and curved towards the mouth, plentifully echinates the surface of this cavity. Size of specimen about $\frac{1}{2}$ inch high by $\frac{1}{3}$ inch in its widest part.

Obs. The spiculation in this small pear-shaped species generally is, with the exception of the radiates in the surface, comparatively large, and the cribrated sarcode stretched across the holes of the cloaca, although unusual in the calcareous sponges, is not uncommon at the vents of the *non*-calcareous ones. In one small specimen, for there are several of different sizes, the peristome is as long as the body of the sponge itself, which is 3-24ths inch, showing that the matured size of the spicules may be independent of that of the sponge.

The next form to be described is very much like this, but, in addition to the large curved acerates of the surface, possesses *cones or conical spines* formed of a great number of fine spicules like those of the peristome interspersed between them.

31. *Leuconia erinaceus.*

Individualized and social. Specimen pyriform, sack-like, wide above, where it is furnished with a peristome, narrowed to the point of attachment below. Colour whitish yellow outside, sponge-brown within. Surface-sarcode cribriform or reticulate, knitting together the radiates of this part, which are small; echinated with two kinds of spines, viz. one conical, composed of a great number of fine, long, glistening spicules like those of the peristome, and the other consisting of a single, thick, sickle-shaped acerate, interspersed among the glistening white cones. Pores the holes of the cribriform sarcode. Vent single, terminal, circular, provided with a well-marked sarcodic sphincter, surrounded by the palisading of the peristome, which is somewhat everted; leading into a narrow cloacal cavity about half the width of the wall in its greatest diameter, which part is opposite the greatest diameter of the specimen, diminishing afterwards towards either end; covered with a sarcodic membrane presenting circular holes which are opposite those of the cloaca; holes of the latter wide and circular, but variable in size and distance apart, permitting the terminal openings of the canal-system in plurality to be seen *within*. Wall consisting of cancellated sarcode traversed by the canals of the excretory system; supported on a skeletal structure consisting of regular and

irregular triradiates with long shafts, especially on the outside, where they extend inwards from the other two arms which are fixed in the spicular structure of the surface. Spicules of two kinds, viz. acerate and triradiate; no quadriradiates:—1, acerates of two forms, viz. one fine, long, straight, cylindrical, and glistening, and the other stout, much shorter, fusiform, and sickle-shaped; 2, triradiates, regular and irregular, with long shafts but not particularly large. No. 1 in its fine form is confined to the peristome and the composition of the conical spines of the surface, which are about 200-6000ths long, 300-6000ths apart, and 90-6000ths in. in diameter at the base, where their spicules are sunk into the outer part of the wall; and the other or stout form, which consists of a *thick acerate* that is much shorter than the "cones" and curved towards the mouth, plentifully scattered among them, where its largest portion is outside and the other or more attenuated one is sunk into the outer portion of the wall-structure; no. 2, the triradiates, occupy the position mentioned, including the surface of the cloaca, which possesses *no* quadriradiates, and therefore presents *no* spines or "fourth arms" on its surface. Size of largest specimen, for there are several, about $\frac{1}{2}$ inch high by $\frac{1}{4}$ inch in its greatest diameter.

Obs. This is a very remarkable species on account of the glistening cones, composed of spicules like those of the peristome, which are scattered over the surface in the midst of large sickle-shaped acerates which do not glisten, and therefore by their colour, as well as by their form, produce a mixture and a contrast which renders this sponge unmistakable; while the cones from their prominence, whiteness, large size, pointed ends, abundance, and almost perpendicular arrangement on the surface so remind one of the echination of a "hedgehog," that the latin name of this animal has been used for its specification. The cloaca here also is covered with a delicate layer of clathrous sarcode.

32. *Leuconia nivea*, var. *australiensis*.

Individualized or agglomerated. Globular, sessile, and solitary, or massive, agglomerated, flat, and spreading. Colour whitish outside, sponge-brown within. Surface consisting of cribriform sarcode, more or less charged with mortar-spicules, knitting together large, more or less sagittal triradiates, with centre so much *elevated* that they present a tripod-form, whose extended arms thus bind down the surface to a common level. Pores, the holes of the cribriform structure more or less grouped into distinct areas, which occupy the intervals between

the arms of the triradiates. Vent single and terminal in the individualized solitary forms, in plurality in the flat ones, in which they are more or less uniformly scattered over the surface in a papillated state, about $\frac{1}{6}$ inch apart, each furnished with a minute peristome, which consists of *mortar-spicules* like those that fringe the pores of the dermal cribriform sarcode; leading in the globular forms into a regularly formed cloaca corresponding in shape with the specimen, and into irregularly branched canals in the flat ones; holes of the cloaca of different sizes and different distances apart, the largest more or less sunk into the internal structure, and all affording outlets to a variable number of excretory canals; surface of the cloaca, together with that of the holes and their subsequent extensions respectively into the internal structures, thickly echinated with small spines, viz. the fourth arms of the quadriradiates. Wall composed of cancellated structure, that is the parenchyma, traversed by the canals of the excretory system, supported on a skeletal structure composed of small triradiates. Spicules of three kinds, viz. acerate, triradiate, and quadriradiate:—1, acerates, minute, sinuous, and lanceolate at one end, about 14 by $\frac{1}{2}$-6000th in.; 2, triradiates, of two sizes, viz. those of the wall-structure, which are small and more or less regular, and those of the surface, which are large, averaging 105 by 9-6000ths in. in the shaft, with arms respectively a little less; 3, quadriradiates, with long expanded arms and very short spine or fourth ray. No. 1 is confined to the cribriform sarcode of the surface and to the peristome, where in the former it acts as a mortar-spicule; no. 2 chiefly to the structure of the wall and the surface respectively, as before stated; and no. 3 to the surface of the cloaca, where the spines or fourth rays are so small and short that they can only be seen laterally. Size of globular form about 4-12ths inch high and 3-12ths inch in diameter horizontally; the flat form is merely a fragment about an inch in diameter and 1-24th inch thick.

Obs. With the exception of trifling differences, the Australian species in its *flat* form is almost identical with the British one called *Leuconia nivea*, Bk. (*Leucandra nivea*, H., Atlas, Taf. xxxix.)—that is, there are no quadriradiates like those represented by Bowerbank (Mon. vol. iii. pl. v. fig. 8), and the elements of the surface in *L. nivea* appear to be much more confused and indistinct, while they are beautifully defined in the Australian form; but in other respects the latter appears to be so nearly allied to the British one that it can hardly be considered more than a variety of it.

33. *Leuconia Johnstonii*, var. *australiensis*.

Individualized. Globoconical, sessile, rather compressed, open and conical above, convex and wide below, where the most prominent part becomes the point of attachment; no peristome. Colour whitish outside, sponge-brown within. Surface consisting of cribriform sarcode charged with triradiates, faced by comparatively large quadriradiates. Pores, the holes of the cribriform sarcode, varying in size under 1-200th inch (? are the largest for *ex*halant purposes). Vent single, terminal, naked, leading into a sacciform cylindrical cloaca, corresponding in shape with that of the specimen, about the same diameter in its widest part as the thickness of the wall; scantily overscattered with a few holes of widely different sizes, viz. some very large (1-24th inch in diameter) and others very small, situated at variable distances apart, and the large ones so sunk into the internal structure that they appear like diverticula of the cloaca, into which more or less of the excretory canals of the internal structure open, and thus pour out their contents before the latter enter the cavity of the cloaca itself; surface of the cloaca, together with its diverticula, entirely smooth and void of all echination, being bound down by sagittal triradiates *only*. Wall comparatively thick, consisting of cancellated sarcodic structure traversed by the canals of the excretory system, supported by a skeletal structure composed of triradiates and quadriradiates of different sizes, among which the sagittal form is most conspicuous. Spicules of two kinds, viz. triradiate and quadriradiate:—1, triradiates, of different sizes, chiefly irregular, among which the sagittal is, as just stated, the most conspicuous; 2, quadriradiates, of different sizes, which are again mostly sagittal, that of the surface, which is by far the largest, averaging 135 by 12-6000ths in. in the shaft and a little less in the arms, so that it has an *equiarmed* appearance; the arms arching upwards and outwards serve to bind down the dermal structure, and the shaft descending perpendicularly to support it from within; while thus traversing the outer part of the wall the shafts are accompanied by dilated portions in their intervals which are identical in appearance with the "subdermal cavities" of the non-calcareous sponges. No. 1 is abundant in the skeletal structure of the wall and in its limiting layers, viz. that of the surface or cortex and that of the cloaca; no. 2, the quadriradiate, is equally abundant with the triradiates in the structure of the wall, and almost exclusively on the surface of the body, but *entirely absent* on that of the cloaca, on which a curved spine or fourth arm is not to

be seen. Size of largest specimen, viz. that described (the other, which is very small, being just the opposite in point of general form), about ½ inch high by 5-12ths inch in its greatest diameter.

Obs. It is remarkable here that while the quadriradiates abound on the surface and are so large as to form a character, their *absence* is equally characteristic on the surface of the cloaca. To facilitate recognition of the *quadriradiate* on the surface it might be observed, as in the preliminary remarks, that the passage of the light *through* the centre of the head or triradiate portion invariably causes that part to present a dark *triangular* space, whose points are in the angles of the rays; while when the *triradiate* is in such a position as to show a dark area (that is when viewed laterally), this is *quadrangular*. At first sight the presence of the large quadriradiate on the *surface* causes this species to resemble the British *Leuconia Johnstonii*; but the peculiar form of the quadriradiate and its fourth arm on the cloaca of the latter, together with other minor differences, causes it to be merely a variety.

34. *Aphroceras asconoides.*

Individualized and social. Specimen consisting of a group of individuals growing from a contracted base. Individual long, narrow, tubular, sessile, somewhat compressed, diminishing in size towards the free end, which is truncate, and contracted towards the other, which is fixed; without peristome; varying in size under 1½ inch long by 3-24ths inch in transverse diameter, often putting forth a bud or small branch towards the lower part. Colour yellowish white. Surface even, glistening when dry, composed of a layer of long, slightly curved acerates, arranged longitudinally and very near together, separated only by cribriform sarcode, traversed so thickly by the *exserted* arms of *internal* radiates as to present a minutely hispid appearance. Pores, the holes in the cribriform sarcode, opening between the long acerate spicules, and in the midst of the exserted arms of the internal radiates. Vent single, terminal, naked, leading into a cloacal cavity which is tubular, corresponding with the shape of the individual; presenting *no* cloacal structure, but a number of minute circular pores in direct continuation with those of the surface, in the midst of a layer of spongozoa in juxtaposition, with which that remarkable granuliferous nucleated body called by Häckel the "Kern" (to which I have already alluded in describing *Clathrina cavata*, 'Annals,' 1886, vol. xvii. p. 502) is plentifully mixed; supported on a skeletal structure composed

of comparatively small and delicate sagittal quadriradiates, which will be more particularly described hereafter. Wall very thin, not more than 1-112th inch in diameter, consisting of only two skeletal layers, viz. an external and an internal one, the former composed of the large slightly curved acerates before mentioned, and the latter of the delicate quadriradiates just noticed, which support the soft parts of the species. Spicules of two kinds, viz. acerate and quadriradiate:—1, acerates, very large, long, symmetrically fusiform, slightly curved, sharp-pointed at each end, averaging 1-12th inch long and 25-6000ths in. in transverse diameter; 2, quadriradiates, more or less sagittal in form, with a long shaft directed longitudinally backwards when *in situ*, and the two arms expanded laterally almost perpendicular to the shaft, with the fourth arm, which is short and curved towards the mouth, directed inwardly; shaft about 90 by 1-6000th in., arm 43 by 1-6000th. No. 1 forms a single layer on the surface as before stated, and no. 2 the internal layer also before noticed, with more or less of the arms exserted between the long acerates, so as to give this part a minutely hispid appearance. At first sight the latter look like mortar-spicules or small acerates, but although they appear to serve the same purpose, they are *not* so, but what I have stated. Size of group about 2 inches in diameter at the circumference, contracted to a point at the base.

Obs. In *structure* this species is very like Häckel's *Asculmis armata* ('Atlas,' Taf. xiii. fig. 1), but of course very different otherwise. It is remarkable too that the "granuliferous nucleated cell" or "Kern" which is so characteristically abundant in the Ascones (ex. gr. *Clathrina*) should be equally abundant here.

35. *Aphroceras syconoides.*

Individualized. Long, sessile, round, cylindrical, diminishing towards the mouth, which is truncate, also towards the fixed end, which is contracted; without peristome. Colour in the dried state whitish grey. Surface consisting of cribriform sarcode, charged with mortar-spicules, more or less concealing subjacent, large, slightly curved, fusiform acerates, arranged longitudinally, parallelly, and in close approximation. Pores in lines, in the cribriform sarcode between the long acerates. Vent single, terminal, naked, leading into a cloacal cavity which is narrow and accords in shape with that of the specimen; covered with circular sphinctered holes in juxtaposition and of nearly uniform size; echinated with the

fourth arm of quadriradiates, which is small, curved, and short. Wall about 1-30th inch thick, composed of "*radial chambers*" in juxtaposition, extending from the circular pores on the surface to the holes of the cloaca; supported by a skeletal framework consisting of a great number of small radiates, that is "articulated;" the whole held together by sarcode pierced by pores of intercommunication. Spicules of three kinds, viz. acerate, triradiate, and quadriradiate:—1, acerates, of two forms, viz. one very large, long, symmetrically fusiform, slightly curved and pointed at each end, about 150 by 6-6000ths in., and the other minute, somewhat sinuous and lance-pointed at one end, 13 by 1-6000th in; 2, triradiates, more or less sagittal and comparatively small, averaging about 48 by 2-6000ths in. in the shaft and 15 by 2-6000ths in. in the arms respectively; 3, quadriradiates, with the fourth arm, as usual, much shorter than the rest, and curved towards the mouth. No. 1 in its large form is confined to a single layer on the surface, where they are arranged longitudinally parallel to each other and closely approximated, and in the minute form to the cribriform sarcode of the surface, wherein it plays the part of a mortar-spicule; no. 2, the triradiates, to the radial chambers, where their heads are inwards and their shafts directed outwards; and no. 3, the quadriradiates, which are also sagittal, to the surface of the cloaca, where the fourth arm is so short that, to be well seen *in situ*, this surface must be viewed under the microscope *laterally*. Size of specimen $\frac{3}{4}$ inch high by 7-48ths in its greatest horizontal diameter.

Obs. In general form and structure this species is very much like Schmidt's *Ute glabra* (Adriat. Spong. 1 Suppl. p. 23, Taf. iii. fig. 1), but the fourth arm of the quadriradiate is much less developed; and from Häckel's spiculation ('Atlas,' Taf. lvi. figs. 1 *a*–1 *t*) there does not appear to have been any "mortar-spicule." Again, had it been identical with the Australian species, the beauty and striking appearance of the pores on the surface in the latter (which, for the most part, are conspicuously situated in lines between the large acerates, very little less in size than the holes of the cloaca, and each terminating the external end of a radial chamber) would hardly have passed unnoticed, so that it may be assumed that, if not a variety, it must be considered a species of *Ute*. At the same time it may be as well to consider whether the species should be called "*Ute*" or "*Aphroceras*."

In 1858 Dr. J. E. Gray described and illustrated a small, branched calcareous sponge from Hongkong under the name of "*Aphroceras alcicornis*" (Proc. Zool. Soc. 1858, p. 113, pl. x.

figs. 1 and 2), of which he subsequently made a family under the name of "Aphrocerasidæ" (*ib.* 1867, p. 558); meanwhile Dr. Bowerbank described a British species under the name of "*Leucogypsia Gossei*," for which he established the genus "*Leucogypsia*" (Phil. Trans. 1862, p. 1095, pl. lxxii. figs. 3 and 4); and, lastly, Häckel in 1870 called these species respectively "*Leucandra alcicornis*" and "*L. Gossei*," which he placed in the genus *Leucandra* of his family Leucones.

Now an examination of *Aphroceras alcicornis* and *Leucogypsia Gossei* shows that they are almost identical in structure and spiculation, although very different in form; thus they, in their aggregate state, may have a plurality of vents which are all *un*peristomed, each of which may lead into a separate narrow cloaca, which may be once or twice locularly divided, and each loculus indistinctly limited by further dividing into several large canals, thus forming a step towards a simple, branched, canalicular structure without distinct cloaca, as will be found by-and-by in *Teichonella prolifera*; while the structure in which these cloacas are situated consists of cancellated sarcode permeated by the canals of the excretory system, and supported on a spicular skeleton consisting of small radiates, traversed longitudinally by large, long, fusiform, slightly curved, symmetrical acerates, more or less pointed at each end, arranged longitudinally and parallel to each other *throughout* the structure of the wall, but generally most abundant towards the surface *.

Of the fact that both of these species have been placed by Häckel in his family of Leucones there can be no doubt; nor can there be any that Dr. Gray's name, in the matter of nomenclatural priority, takes precedence of all others.

On the other hand, to Schmidt's "*Ute glabra*," which was described in 1864 (*l. c.*), Häckel, in 1870, gave the name of *Sycandra glabra*, and placed it under the genus *Sycandra* in his family of Sycones.

Thus my *Aphroceras asconoides* and *A. syconoides* (which latter is but a variety of Schmidt's *Ute glabra*), together with *Aphroceras alcicornis*, Gray, would, if relegated according to the *structure of their walls*, come under Häckel's families of Ascones, Sycones, and Leucones respectively; but if relegated according to the *striking character of their spiculation* which the large parallel acerates present, *all* would come under the

* Mr. Thomas H. Higgin, F.L.S., of Liverpool, in 1874, found a *branched* species of *Aphroceras* at Holyhead, which I have described under the name of *A. ramosa* (see Report I of the Liverpool Marine Biological Committee upon the "Fauna of Liverpool Bay and the Neighbouring Seas," p. 92, ed. Prof. W. A. Herdman, D.Sc. &c. 1886).

family for which Dr. Gray has proposed the name of "Aphrocerasidæ," and which Häckel has placed among his Leucones, as above stated.

Are we, then, to distribute these species according to the structure of the wall or according to their peculiar spiculation? for "peculiar" it is, since the acerate form that I have described is not, to my knowledge, to be found in any other calcareous sponges but the "Aphrocerasidæ." I must leave this for future observation to decide, while for the present their descriptions may remain where they are.

It is possible that here and there one of the large acerates may have a lanciform end or vary a little in its symmetrical form; but these are accidental occurrences.

Here I might add that, as this form of acerate spicule is identical with one which is very common among the *non*-calcareous sponges, and the "Aphrocerasidæ" are the only ones in which it occurs among the calcareous sponges of the present day, so it may be assumed, in a fossil point of view, as Zittel has done, that a calcareous sponge did exist in the Cretaceous age, in which the only spicules were of this form, that is without radiates; and hence Zittel has instituted for his third family of fossil calcareous sponges the name of "Pharetrones," which, until this assumption can be proved, must remain, as Prof. Sollas has described and illustrated it, under the name of *Pharetrospongia Strahani*, among the *non*-calcareous sponges, or those possessing *siliceous* spicules of this form alone (Quart. Journ. Geol. Soc. 1877, vol. xxxiii. p. 242 &c. pl. xi.).

The next species that will be described, as hitherto it has only been named, is of the same type as *Aphroceras*, but possesses a form of the triradiate spicule which is so peculiar that it has been actually identified with one in a fossil calcareous sponge of Jurassic age, and is therefore also of much palæontological interest. It is that to which I have alluded in my preliminary remarks under the name of *Lelapia australis* ('Annals,' 1886, vol. xvii. p. 440).

36. *Lelapia australis*, Gray.

Lelapia australis, Gray, Proc. Zool. Soc. 1867, p. 557.

Individualized. Cylindrical, with enlarged free end bent upon itself and elongated transversely, hammer-like. Colour whitish yellow. Surface even, presenting a number of large long acerates like those of the foregoing species, imbedded longitudinally at variable distances apart, being more or less obscured

superficially by the presence of a dermal layer of small acerates and mortar-spicules. Pores indiscriminately scattered over the surface. Vent single, at one end of the transversely elongated head, which is more acuminated than the other, where it is furnished with a short glistening peristome, leading into a cloaca that extends in a cylindrical form, increasing in size from the base to the head, where, corresponding with the hammer-like form of this part, it divides into two portions, one of which leads to the closed, and the other to the open end; surface of the cloaca presenting throughout several subcircular holes of different sizes and distances apart, each of which is furnished with a sphinctral diaphragm of sarcode, and the whole sparsely echinated with the fourth arms of quadriradiates, which are very short. Wall composed of cancellated canaliferous sarcode, like that of the genus *Heteropia*, traversed in its *entirety* longitudinally and abundantly by the large acerate spicules at various distances apart, which are crossed perpendicularly *at intervals* by bundles of small thin tricurvates which possess the peculiar form that will be mentioned hereafter, and extend from the surface on one side to the cloaca on the other. Spicules of three kinds, viz. acerate, triradiate, and quadriradiate:—1, acerates, consisting of those which belong to the peristome, the body, and the surface respectively; 2, triradiates, divided into those which belong to the surface and the cloaca respectively; and 3, quadriradiates, which appear to be very few in number on the cloaca, confined to the surface of the latter and that of the body. Acerate of the peristome long, straight, cylindrical, thin, glistening, sharp-pointed at each end, averaging 300 by $1\frac{1}{2}$-6000th in.; that of the body, including the wall and the surface or cortex, also long but thick, almost equally fusiform, slightly curved and more or less sharp-pointed at each end, averaging 330 by 18-6000ths in., and that of the surface minute, straight, and lance-pointed at one end, in short the "mortar-spicule;" all three forms equally abundant in their several localities. Triradiates of various forms and sizes, according to their position, viz. those on the surface small and those in the cloaca large, the latter sagittal with very long and almost straight arms expanded perpendicularly to the shaft, which is very short and straight, apparently reduced in size inversely to that of the arms, the latter becoming *flattened vertically* towards the commencement or proximal end of the peristome, where, by extending perpendicularly across its spicules while the reduced shaft is directed as perpendicularly backwards, they act, as before stated, in securing the position of this palisading like the cross bars of a row of pales. Quadri-

radiates small on the surface, where they are mixed up with the mortar-spicules &c., and scanty on the cloaca, where in their triradiate portions they accord in size and form with the sagittal triradiates of the latter, but with the addition of the fourth arm, which is comparatively short and scantily echinates the interior of the cavity. With reference to that peculiar form of triradiates, whose position has before been stated, and which is of so much palæontological interest here, it may be observed that it is two-pronged fork-like, in which two of the arms are projected forwards parallel to each other and closely approximated, while the third or shaft is prolonged backwards in the opposite direction, altogether resembling a "tuning-fork," in which the arms are smooth, round, and pointed, about 60 by 1-6000th in. in their greatest dimensions, with one arm a little longer than the other, while the shaft, which may be a little longer and double the thickness, is smooth, round, and also pointed, about 75 by 2-6000ths. In their natural position they lie parallel to each other, with their shafts *outwards* and their forks directed towards the cloaca in bundles "at intervals," as before stated, while it should be added that there are *no* other spicules in the skeletal structure of the wall but the large long acerates and these crossing bundles, hence the clathrous structure of the simple sarcode becomes very evident, simulating that of the genus *Heteropia* rather than that of a *Leuconia*, which, on the contrary, is charged with radiates throughout and thus thickened. They are also to be found among the peristome-spicules towards their lower part. Size of specimen $\frac{3}{4}$ in. high by $\frac{1}{4}$ in. in diameter horizontally; breadth of head transversely about $\frac{1}{2}$ in.

Obs. It is impossible to compare the above description with that of Häckel's *Leucortis pulvinar* ('Kalkschwämme,' vol. ii. pp. 164–166) without seeing that the two are closely allied, and that, but for the absence of the quadriradiate, the minute acerates or "mortar-spicules," and the peristome in his illustrations (Taf. 29), one would have been inclined to say it was the same. The "peristome-spicule," however, is mentioned in the description, but the shape of the large thick body-acerates being *sinuous* (*cf.* illustrations), instead of simply curved, is not the same; so that altogether it is necessary to give our species a different designation; and as this has been done by Dr. Gray both generically and specifically for the original two-pronged fork-like spicules figured by Dr. Bowerbank, which also came from S.W. Australia, as noticed in my preliminary remarks (*l. c.*), we may fairly assume that they came from this species, and so I have

adopted Dr. Gray's name. Häckel's "connective variety," viz. *Leucandra pulvinar* (p. 164), is said to present the quadriradiate; but as no other part of the spiculation is mentioned, we must assume here that it was the same as that of his typical species "*Leucortis pulvinar*."

I have already alluded to the fork-like spicule as being interesting, because it has been discovered in a fossilized Calcisponge from the "Cretaceous" (*l. c.*); but the largest and most perfect that I could find in the mounted slice of *Sestrostomella rugosa*, in which it was first noticed by Dr. Hinde, who kindly lent it to me for examination, is not quite half so large as the largest that I have been able to see in *Lelapia australis*, added to which the shaft was lanceolate at the end in the fossil as in that of *Leucetta pandora*, represented by Häckel (Taf. xxiii. &c.), and not simply pointed like all those that I have seen in *Lelapia australis*; but we know that position may influence these trifling differences, and even those two figured by Dr. Bowerbank (*op. et loc. cit.*) are not alike in this respect, the shaft in one being simply pointed and in the other inflated before the end or lanceolate.

It is remarkable too that the two arms *without* the shaft should bear considerable resemblance to the forcipitous flesh-spicule in the genus *Forcepia* among the siliceous sponges (*Halichondria forcepis*, Bk., Mon. B. Sp. vol. iii. pl. xliii. fig. 13), wherein also the arms are long, parallelly approximated, and of *unequal* length. In one it is the arms of a triradiate and in the other a bent acerate.

Observation.

We have now come to species of *Leuconia* in which the typical form of the "cloaca" no longer exists, and this was initiated by the division and indistinctly circumscribed condition of these cavities in *Aphroceras alcicornis* and *Leucogypsia Gossei*; there is no longer any peristome, and both this and the cloaca in the following species will at last be found to disappear altogether, when the excretory canals, which hitherto have ended in a cloacal dilatation and peristomed vent, will be found to open directly on the surface without the intervention of either.

37. *Leuconia multifida.*

Agglomerated. Specimen sessile, massive, compressed, irregularly undulating on the margin, which is thus divided into five more or less conical and projecting portions, each provided with a mouth, but *no* peristome. Colour whitish

yellow outside, sponge-brown within. Surface consisting of lace-like cribriform sarcode charged with mortar-spicules, and knitting together tolerably large triradiates, that is wide with thinnish arms, more or less uniform in size. Pores, the holes in the cribriform structure, averaging 1-400th in. in diameter, mixed with larger ones four times the size, which often appear to have been produced by disruption of the sarcodic partitions between the smaller ones. Vents single, terminal, naked, one upon each conical projection, each leading into a cloaca, which is narrow, ending in a general one that is broad, irregular, and compressed like the specimen; holes of the cloaca circular, irregular in size and distance apart, leading inwardly to one or more openings which belong to the excretory canals of the internal structure. Walls as indistinctly defined internally as the cloacal cavity is irregular, and, owing to the compressed form of the specimen, presenting a greater thickness of the cancellated structure in one direction than the other, so that, for want of definition, it *can* only be considered "wall" in name; cancellated structure consisting of parenchyma traversed by the canals of the excretory system, supported by a spicular structure which is composed of radiates of different sizes, but mostly large, irregularly distributed, and so far apart as to cause the sarcodic portion just under the cribriform structure of the surface to present dilatations similar to the subdermal cavities of the non-calcareous sponges. Spicules of two kinds, viz. acerate and triradiate:—1, acerate, minute, sinuous, with one end lance-pointed, averaging 15 by $\frac{1}{2}$-6000th in.; 2, triradiates, regular and irregular, of different sizes, averaging 117 by 8-6000ths. No. 1 is confined to the cribriform sarcode of the surface, where it forms the mortar-spicule; no. 2, the triradiates, about the same size, both on the surface and in the wall structure, only a little stouter in the latter; thinnest on the surface of the cloaca, where, as usual, they present long, expanded arms and short shafts respectively. Size of specimen $\frac{1}{2}$ in. high by 10-12ths × 3-12ths horizontally.

Obs. There is nothing very striking in this species to distinguish it from the following except the absence of quadriradiates and the larger size of the staple spiculation, that is the spiculation of the parenchyma, which, of course, renders this structure less compact than where the spicules are smaller and more numerous. It is charged with ova about 13-6000ths in. in diameter, bearing the germinal vesicle and accompanied as usual by granuliferous cells about 4-6000ths in. in diameter, which may be spermatic—easily recognized as the spongozoa are not half this size—measurements which

could not have been made had not the specimen been in a favourable state for such observations.

The words "large" and "small," tolerable" and "moderate," &c., with reference to the size of the spicules, have been used for convenience; but they are all indefinite terms, which are only rendered satisfactory when accompanied by actual measurements. Still, it should be remembered that when they are used the magnifying-power should be the same for all, otherwise what is small at one time may appear large at another, and *vice versâ*.

38. *Leuconia lobata.*

Specimen massive, sessile, lobate, presenting two or more apertures of unequal size, not peristomed. Colour whitish yellow. Surface even, compact, chiefly consisting of mortar-spicules and small radiates, interspersed here and there with a large one which belongs to the internal structure. Pores not conspicuous. Vents two or more, naked, of different sizes, leading into a single, irregular, and indistinctly defined cloacal cavity, whose surface is scattered over with holes of different sizes, more or less sunk into the internal structure and in direct continuation with the large ends of the canals of the excretory system; echinated throughout with the fourth arm of sagittal quadriradiates, which is minute. Internal structure cancellous, traversed by the canals of the excretory system, which end in the diverticula of the cloaca already mentioned. Spicules of three kinds, viz. acerate, triradiate, and quadriradiate:—1, accrates, minute, sinuous, lance-pointed at one end, about 13 by $\frac{1}{2}$-6000th in.; 2, triradiates of two sizes, viz. small and large, the rays of the latter generally averaging 105 by 9-6000ths in.; 3, quadriradiates of three sizes, the largest of which is of much the same size as the larger triradiates. No. 1, which is confined to the surface, is the "mortar-spicule;" no. 2, the triradiate, in its small size is confined to the surface, where it is mixed up with the mortar-spicule, and in its larger one to the structure of the interior, extending here and there also to the surface; no. 3, the quadriradiates in their smallest size are mixed up with the triradiates and mortar-spicules of the surface, in their largest size they belong to the parenchyma, where they are mixed up with the triradiates of this structure, and in their thin sagittal form to the surface of the cloaca, where, as usual, the arms are very long, almost straight, and expanded perpendicularly to the shaft, which is comparatively short and straight, averaging 16 by 3-6000ths, while the arms average 60 by 4-6000ths; the fourth arm, which is shorter still, not only echinating the

surface of the cloaca, but also extending into the canals of the internal structure. Size of specimen $\frac{3}{4}$ in. in height by 1 in. in diameter.

Obs. The compactness and consequent whiteness of the structure in this species contrasts strongly with that of *Leuconia multifida*, if the presence of the quadriradiates did not absolutely make the distinction.

39. *Leuconia compacta.*

Specimen massive, sessile, lobate, lobes round, furnished with a plurality of small naked vents, growing on and enveloping the small stems of a Fucus. Colour whitish, opaque. Surface even, consisting of cribriform sarcode cementing together into compact structure small, more or less regular triradiate and quadriradiate spicules of uniform size and appearance, thickly echinated with very large and much curved acerates. Pores, the holes in the cribriform structure, uniformly small, about 3 to 6-6000ths in. in diameter. Vents in plurality, of different sizes, scattered irregularly over the surface, the largest on the most prominent parts of the lobes respectively; all without peristome, that is naked, leading into narrow, irregularly defined, cloacal cavities, which branch off into the substance of the body or parenchyma, where they become almost infinitely subdivided; surface of the cloacal cavities, together with the canals entering them, slightly echinated with the fourth arm of quadriradiates. Structure of the wall, or rather body as it may be termed (for these distinctions *now* begin to disappear), compact, consisting of parenchyma infinitely divided by the branching and rebranching of the excretory canal-system, as just mentioned; supported on a skeletal structure consisting of small triradiates and quadriradiates like those of the surface. Spicules of three kinds, viz. acerate, triradiate, and quadriradiate:—1, acerates, large, stout, unsymmetrically fusiform, much curved, averaging 180 by 21-6000ths; 2, triradiates, regular and irregular, uniformly small, arms averaging 30 by $4\frac{1}{2}$-6000ths; 3, quadriradiates, about the same size, but with the fourth arm, as usual, much shorter than the rest. No. 1 thickly echinates the surface, where the thicker half, which is much curved, is free, and the thinner one is sunk into the substance of the body, with whose spicular structure in size also it forms a great contrast, as may be learned from the measurements above given of the acerates and radiates respectively; nos. 2 and 3 are uniformly distributed throughout the body, in which the surface of the cloacal dilatations and the large canals respectively are sparsely echinated with the fourth ray

of the latter. Size of specimen about $\frac{3}{4}$ in. in diameter each way.

Obs. This species in the structure of the body (for, as before stated, there is no differentiation now into cortex and wall, and very little between the excretory canal-system and the cloaca) is very much like *Teichonella prolifera*, from which, however, it not only differs in general form, but in the presence of the large, stout, curved acerates instead of large quadriradiates on the surface as in the latter, and in a slight tendency to a cloacal termination of the excretory systems, wherein the typical form of the cloaca is becoming lost in the enlargement of its holes and their branching off into the canalicular structure of the interior.

40. *Leucaltis floridana*, H., var. *australiensis*.

Specimen massive, without particular form, looking as if it had grown over some marine rubbish, stems and stuff of some kind in a floating or unfixed state; lobed irregularly; lobes, where existing, conical, compressed, with or without a mouth, but with no peristome. Colour dirty yellowish brown. Consistence firm, hard, especially in the dry state. Surface rough and harsh to the feel, from the projecting rays of *large* triradiates plentifully mixed with the smaller ones, or staple size of the body, presenting here and there low gentle elevations in tolerable uniformity, and also here and there a tract of granulated appearance, consisting of small conical or tent-like forms about 1-40th in. in diameter, 1-100th in. high, and 1-40th in. apart. Pores, as usual, in the reticulation of the surface. Vents numerous, large and small, scattered irregularly over the surface, the larger ones only leading into genuine cloacas, the others into simple dilatations of the structure; surface of the cloaca smooth, rendered very uneven by large and small holes, at wide but variable distances apart, deeply sunk into the body-structure through wide infundibular depressions which finally end in openings of the canals of the excretory system, echinated apparently as much by the arms of triradiates as by the fourth arm of quadriradiates. Structure of the body consisting of densely cancellated parenchyma traversed by the branches of the excretory canal-system, supported on a skeletal fabric composed chiefly of small radiates plentifully mixed with very large ones, undefined either by a cortical layer externally or a cloacal one internally. Spicules of three kinds, viz. acerate, triradiate, and quadriradiate:—1, acerates, very minute, thin, straight, cylindrical, about 100-6000ths in. long by 1-6000th in. in diameter; 2, triradiates, large and small, more or less equiradiate and equiangular, ray of the former averaging 282

by 51-6000ths, and of the latter 36 by 3-6000ths, thus the larger triradiate is eight times as large as the smaller one, which, on the other hand, is the most numerous, or the "staple spicule" of the body; 3, quadriradiates the same as the small triradiates in size, but, of course, provided with the fourth arm, which, as usual, is smaller than the rest. No. 1, the acerates, confined to the surface, where they are arranged tent-like or in a conical form, rising up from a common layer of the same kind on the surface; no. 2, the triradiates, large and small, confined to the body-structure without any evident arrangement; and no. 3, the quadriradiates, mixed with them, of the same size as the staple or small triradiates, but less numerous, also sparsely echinating with their fourth arm the surface of the larger excretory canals, as before stated. Size of the largest specimen, which is dry, rather compressed, oblong, and rounded on the projecting points, apparently produced by attrition while floating about the bottom of the sea, $7\frac{3}{4}$ in. long by $3\frac{3}{4} \times 1\frac{1}{2}$ in. in its other diameters, but very irregular.

Obs. The brown colour of this sponge, both wet and dry, its irregular form, its harsh prickly feel from the arms of the large triradiates projecting beyond the common level of the surface, together with the internal structure, which is a mixture between the cloacal and canalicular excretory systems, and its spiculation, render the species as unmistakable in itself as it is unmistakably like Häckel's *Leucaltis floridana* (Atlas, Taf. xxvi.); as, however, there does not appear to have been any of the *minute* acerate spiculation on the latter, and after much search I have been able to find only one *large* quadriradiate among the *large* triradiates, I have designated it a variety of *Leucaltis floridana*, as the heading will show.

For a calcareous sponge the great size of the largest specimen, viz. $7\frac{3}{4}$ in. long &c., may be considered very unusual. Sometimes the surface presents a reticulation of more or less broken ridges in high relief.

41. *Teichonella prolifera*, Carter.

Teichonella prolifera, Carter, Annals, 1878, vol. ii. p. 35, pl. ii. figs. 1–5.

Finally we come to this species, which simply consists of parenchymatous structure traversed by excretory canal-systems which, beginning by small branches in the interior, terminate respectively by open naked mouths at the surface; supported on a staple mass of small radiates, accompanied more or less plentifully by very large ones, which, from their much greater size, are rendered very conspicuous (see my illustrated

description, *l. c.*). Thus we have no longer any *cortical* differentiation on the surface, nor any *cloacal* cavity interiorly, but a so far simplified structure that it becomes identical with that of the common run of *non*-calcareous sponges.

There are several specimens of this sponge in Mr. Wilson's collection, all more or less like that which I have described (*l. c.*), viz. the largest averaging 3 inches high in their present state, that is after having been broken off from their base of attachment, by 5×5 horizontally, formed as usual of an erect, thick, interfolded lamina with round undulating border in which the vents are situated. When fresh these specimens are said to have presented a "greenish-slate and reddish-brown tint below," now whitish yellow throughout.

In the paper on the "Teichonellidæ," to which I have alluded, will be found another species under the name of *T. labyrinthica*, which, through Mr. Wilson's specimens, I have now found to be so nearly allied in structure and general character to *Grantia compressa*, that it has been considered desirable to remove it from the Teichonellidæ to the vicinity of that sponge, where my reasons for so doing have been more particularly stated (*suprà*, p. 38).

Parasitic Cell in Teichonella prolifera.

One of the specimens of *Teichonella prolifera* is remarkable for being densely charged with the minute nucleated cell, like the human blood-globule, which, in my paper on the Parasites of the Spongidæ ('Annals,' 1878, vol. ii. p. 165), I have described under the name of "*Palmella spongiarum*." Besides being in size and shape like the human blood-globule, it in like manner presents a *pink* tinge, whereby a white sponge, when dry, such as *Halichondria panicea*, Bk., wherein I first found it at this place (Budleigh-Salterton, Devon), becomes coloured by it; and this may account for the "reddish-brown" tint when fresh to which I have alluded. Moreover, this parasite forms half the substance of an incrusting form of an *Aplysina* covering a mussel-shell which is among Mr. Wilson's collections; and the same is the case with a specimen of *Esperia*, from S.W. Australia, which I previously possessed; so that its existence is general.

Summarily it might be stated that Mr. Bracebridge Wilson's collection of S. Australian calcareous sponges has been sufficient to lead us from the simplest structure to one which is identical with that of the ordinary run of non-calcareous sponges, and that therefore, however much it may be desired to make the former a distinct "class," these facts do not justify such a conclusion.

P.S.—Since the above was written, I have found a much larger and more typical specimen of *Lelapia australis*, Gray (to which I have given particular prominence on account of its connexion with fossil species), which by accident had been overlooked in one of Mr. Wilson's later collections from "Port Phillip Heads," and therefore take this opportunity of appending a description of it as follows:—

Lelapia australis, Gray.

Cylindrical, clavate, the largest part upwards, somewhat curved or bent upon itself, rugose longitudinally. Consistence firm. Colour dark grey. Surface even, smooth, interrupted by the projection of crooked ridges extending from the free to the fixed end, subspirally and longitudinally, in broken lengths, sometimes reduced to mere scattered tubercular points, most pronounced on the concave side towards the mouth, least so on the opposite side; largest and most continuous ridge 1-3rd in. long, 1-48th in. broad, and 3-48ths in. high. Pores plentifully scattered over the surface, not remarkably large. Vent single, terminal, represented by a narrow, elliptical opening about 1-3rd in. in its longest diameter, so constricted in the centre as to be closely approximated by an infolding of the lip on each side; provided with a peristome whose spicules here are broken off short; leading into a cloaca corresponding in shape with the specimen, that is wide above, narrowed to a point below (after which the stem becomes solid); in other respects the same as that above described. Structure of the wall, which is about 5-24ths in. thick, together with the spiculation, also much the same as above described; but with these exceptions, viz. that the large acerate spicule of the "body" appears to traverse the wall horizontally as well as longitudinally; while the "ridges" are composed of a mass of acerate spicules of different lengths and thicknesses, averaging 150 by $2\frac{1}{2}$-6000ths in., some of which are simply pointed at each end, others bent and lance-shaped at one end and simply pointed at the other, and a third bent and lance-shaped at each end; all in contact longitudinally with each other, forming a wedge-shaped mass whose narrow end or border, according to the length of the ridge (that is whether linear or reduced to a small tubercular point), is slightly sunk into the wall, and the other, whose spicules, like those of the peristome here, are broken off short, spread out into the ridges of the surface, where the cuticular layer of "mortar-spicules" banks it up on each side. In a dried fragment these masses, in the section especially, present the glistening white aspect of the peristome. Size of specimen

from end to end, across the arc of the curve, $3\frac{1}{4}$ inches; greatest diameter, which is towards the head, 1 inch; least diameter, at the fixed end, which has been broken off from the place of attachment, $\frac{3}{8}$ inch.

Loc. "Port Phillip Heads."

Obs. Besides being far larger than the specimen above described, which I always thought to be more or less deformed, this one probably presents us with the *typical* characters of *Lelapia australis*, and hence my object in appending the above description. It must also, independently of its "typical" value, be considered a large calcareous sponge as the latter generally run. The spiculation may be a trifle larger than as above described, but the ridges are an entirely *new feature*, which in their characters are alone sufficient to distinguish the species; while the large acerate spicules of the body, arranged both transversely and longitudinally in the wall, represent the large sagittal triradiates of the "inarticulate" calcareous sponge-structure; the rest of the spicules here, including that remarkable form, viz. the "fork-like triradiate," to which I have above alluded as being so interesting in connexion with the fossil species *Sestrostomella*, being dwarfed into comparative insignificance.

XVI.—*Descriptions of four new Species of Butterflies from Burmah.* By H. Grose Smith.

Papilio Adamsoni.

Upperside. Anterior wings brown-black, darker towards the base, the nervures and rays between the nervures black. Posterior wings the same colour as the base of the anterior wings, paler towards the anterior margin, crossed beyond the middle by an irregular band of five rosy-white spots, the spot nearest the anterior margin cordate, the next three conical and lunulated externally, the fifth spot at the anal angle nearly obsolete; below the band are three submarginal large spots, lunular, the innermost grey flushed with rosy carmine, the middle spot grey, less rosy, the third the same colour as the band.

Underside. Anterior wings as above, but paler. Posterior wings with the band brighter, larger, more regular and curved, containing six spots, the spot on the anterior margin nearly square, the second the largest and nearly divided by a